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EXAMINER
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ART UNIT	PAPER NUMBER
2612	

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Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/067,826	KARUNEN ET AL.	
	Examiner	Art Unit	
	Nelson D. Hernandez	2612	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 July 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-20* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,4,5,7-9,12,13,15,16,19 and 20* is/are rejected.

7)☒ Claim(s) *2,3,6,10,11,14,17 and 18* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *28 February 2002* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Response to Amendment

1. Examiner acknowledges amendments made on the claims received on July 20, 2005. Claims 16-20 have been newly added.

Response to Arguments

2. Applicant's arguments filed on July 20, 2005 have been fully considered but they are not persuasive.

Applicant contends the following:

a. "Accordingly to COLBETH, the accumulated charge distribution is first read from the CCD array regardless of the fact some of the pixels are known to be defective. A pixel-specific correction word (Figure 9) used to post-process each pixel value, and discrimination against the invalid values that originated from defective pixels is only effected the decode/select 106 (column 9, lines 40-45). Thus, the invalid pixel value gets processed from the output charge well and moved into the processing chain, and only late in its propagation that the invalid pixel value blocked. This well beyond the output charge well as recited in the claims. COLBETH teaches that "binning" is effected even further along the processing chain. See that Figure 8 that the averaging blocks 108 and 110, as well as the buffer/filter block 112, effect what could be called the closest equivalent the binning process of the present invention. Again, this is not as recited. Thus, COLBETH does not teach that charges from at least two pixels are accumulated into the output charge well, with the pixels whose charges are

accumulated being determined on basis of the position(s) of said at least one defected pixel. Therefore, this recitation of the independent claims not satisfied by COLBETH or MCNEIL. The invention provides that discrimination against invalid pixel values coming from defective pixels, as well as the whole concept of binning, are effect very early in the processing chain. Most advantageously, the invalid pixel values do not propagate any further than the output charge well". "No pixel-wise correction needs to be attempted, and the invalid measurement values never actually enter the whole detection and processing apparatus. This takes care of collecting and arranging the measurement data read from the CCD array. COLBETH does not make this teaching. Thus, the invention avoids unnecessary processing operations and erroneous data kept from entering the processing chain, which reduces the possibility of it being erroneously taken into account in the processing valid values".

b. "According to COLBETH, knowing that there are defective pixels does not affect the size and shape of superpixels. See again column lines 40-45. If the pixel value is known to be invalid because of a defective pixel, some corrective data read from memory, so that the corrective data replaces the originally invalid pixel value. This has no affect whatsoever on the averaging or "binning" made in blocks 108, 110 and 112. These blocks operate completely without knowing whether the measurement data includes (corrected) values from the defective pixels or not. The teaching of COLBETH is to replace defective pixel data with corrective data read from memory and then to process the replacement data just

like any other data. Note that COLBETH does not suggest to accumulate charges of any pixels. COLBETH accumulates digital values that represent the charges that have been read out and even corrected with the correction words before any accumulating (or averaging as used in COLBETH) takes place. Quite to the contrary, the present invention re-arranges the whole division of the pixel array into superpixels so that the new superpixels only include valid read pixel data and specifically excludes values from defective pixels. This is a consequence of invalid pixel values being discriminated against the readout process (the defective pixel values not propagating beyond the output charge well)".

Regarding (a), Examiner agrees with the applicant in the sense that COLBETH teaches that "binning" is effected even further along the processing chain, however, COLBETH was not introduce to show that the charges from at least two pixels are accumulated into the output charge well, since said limitation is disclosed by MCNEIL (See MCNEIL, col. 11, lines 11-61; col. 20, line 49 – col. 21, line 5). COLBETH was introduced to show that charges are accumulated are determined on the basis of the positions of said at least one defected pixel in the sensor. Examiner noticed that the charges in COLBETH are digitized and further processed to be accumulated to perform the correction, however, since MCNEIL teaches that the charge coupled device (Fig. 2B: 203) can be configured to perform the "binning" prior to digitizing and processing, Examiner believes that it would have been obvious one of ordinary skill in the art at the time the invention was made to configure the charge coupled device in MCNEIL to

perform the method accumulating charges taught by COLBETH into the output charge well.

Regarding (b), Examiner agrees with applicant that in COLBETH the defective pixels does not affect the size and shape of the superpixels, however having the superpixels affected because of the presence of defective pixels is not present in the claim. Examiner agrees with the applicant in that the teaching of COLBETH is different from the invention because in COLBETH the invention is to replace defective pixel data with corrective data and then to process the replacement data just like any other data and the present invention re-arranges the whole division of the pixel array into superpixels so that the new superpixels only include valid read pixel data and specifically excludes values from defective pixels, however, "re-arranging the whole division of the pixel array into superpixels so that the new superpixels only include valid read pixel data and specifically excludes values from defective pixels" is not present in the claim. Furthermore, Examiner believes that accumulating the charges to perform defective pixel correction as taught by COLBETH reads on the claim as written, since the accumulation of pixel signals is made with the pixels adjacent to the detected defective pixel.

For the reasons above, the rejections made on the previous Office Action are maintained.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

4. Claims 1, 4, 5, 7-9, 12, 13 and 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over McNeil, US Patent 6,800,452 B1 in view of Colbeth, US Patent 6,424,750 B1.

Regarding claim 1, McNeil discloses a method for measuring radiation from an object (test samples as discussed in col. 2, lines 56-67; col. 7, lines 53-67; col. 11, line 65 – col. 12, line 8) with a charge coupled device (Fig. 2B: 203) comprising a matrix of pixels arranged in rows and columns (Col. 11, lines 11-61; col. 20, line 49 – col. 21, line 5), in which method the radiation creates charges to the charge wells of the pixels (Col. 11, lines 11-61; col. 20, line 49 – col. 21, line 5), charges from a column of the pixels is shifted to a serial register (Col. 11, lines 11-61; col. 20, line 49 – col. 21, line 5), the charges in a serial register are shifted to an output charge well (Col. 11, lines 11-61; col. 20, line 49 – col. 21, line 5), the charge is measured from the output charge well and charges from at least two pixels are accumulated into the output charge well (Figs. 3A-3B teaches that the charges form the area 301 of the CCD are read out by binning the pixels of the area 301 as discussed in col. 11, lines 11-61; col. 20, line 49 – col. 21, line 5, thus, it is taught that at least two pixels are accumulated into the output charge well of the CCD sensor of the camera 203 to produce the output result as shown in figs. 3A-

3B). McNeil does not explicitly disclose that the pixels whose charges are accumulated are determined on the basis of the positions of at least one defected pixel in the sensor.

However, Colbeth teaches an X-Ray imaging system that performs binning of analog pixel signals from a detector array (Fig. 2: 12 and fig. 3) by selectively summing, within the detector array, adjacent pixel charges on a row-by-row basis and selectively summing, within detector array readout circuits, the previously summed pixel charges (by rows) on a column-by-column basis, also teaches an array, or mapping, of defective pixel flags being used to identify defective pixels within the detector array, with such flags being added to, or inserted into, the incoming data stream for dynamic processing along with the incoming pixel data, wherein the charge of the pixels adjacent to the defective pixel is accumulated when interpolation is performed to correct said defected pixel based on the location of the defected pixel determined by the flag (Col. 4, line 49 – col. 5, line 44; col. 5, line 55 – col. 6, line 55; col. 8, line 66 – col. 9, line 46; col. 9, line 61 – col. 10, line 20).

Therefore taking the combined teaching of McNeil in view of Colbeth as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify McNeil by detecting the defective pixels in the sensor and accumulating the charges of the pixels adjacent to a detected defective pixel. The motivation to do so would help to correct the defective pixels by performing interpolation as suggested by Colbeth (Col. 9, line 61 – col. 10, line 20).

Regarding claim 4, the combined teaching of McNeil in view of Colbeth as applied to claim 1 teaches that the charges values of the output node are ignored, which

are distorted y at least one defected pixel (Colbeth teaches that accumulate the charges of the non defective pixels to correct the defective pixel, thus, the charge of the defective pixel is ignored, see Col. 9, line 61 – col. 10, line 20). Grounds for rejecting claim 1, apply here.

Regarding claim 5, the combined teaching of McNeil in view of Colbeth as applied to claim 1 teaches that the pixels that are accumulated and measured include all pixels the of which not distorted by defected pixels in the readout process (Colbeth teaches that accumulate the charges of the non defective pixels and then uses that accumulated and measured data to correct the defective pixel, see Col. 9, line 61 – col. 10, line 20). Grounds for rejecting claim 1, apply here.

Regarding claim 7, the combined teaching of McNeil in view of Colbeth teaches the same as in claim 1. Therefore, grounds for rejecting claim 1, apply here.

Regarding claim 8, the combined teaching of McNeil in view of Colbeth teaches the same as in claim 1. Therefore, grounds for rejecting claim 1, apply here.

Regarding claim 9, McNeil discloses an arrangement for measuring radiation (Test samples as discussed in col. 2, lines 56-67; col. 7, lines 53-67; col. 11, line 65 – col. 12, line 8) comprising a charge coupled device (Fig. 2B: 203) with a matrix of charge wells ranged in rows and columns of pixels (Col. 11, lines 11-61; col. 20, line 49 – col. 21, line 5), the arrangement also comprising: a serial register for receiving charges from a column of the parallel register pixels (Col. 11, lines 11-61; col. 20, line 49 – col. 21, line 5), output well for receiving charges from the serial register (Col. 11, lines 11-61; col. 20, line 49 – col. 21, line 5), means for measuring the charge from the

output well, and means for accumulating charges from at least two pixels (Figs. 3A-3B teaches that the charges form the area 301 of the CCD are read out by binning the pixels of the area 301 as discussed in col. 11, lines 11-61; col. 20, line 49 – col. 21, line 5, thus, it is taught that at least two pixels are accumulated into the output charge well of the CCD sensor of the camera 203 to produce the output result as shown in figs. 3A-3B). McNeil does not explicitly disclose that the pixels whose charges are accumulated are determined on the basis of the positions of said at least one defected pixel in the sensor.

However, Colbeth teaches an X-Ray imaging system that performs binning of analog pixel signals from a detector array (Fig. 2: 12 and fig. 3) by selectively summing, within the detector array, adjacent pixel charges on a row-by-row basis and selectively summing, within detector array readout circuits, the previously summed pixel charges (by rows) on a column-by-column basis, also teaches an array, or mapping, of defective pixel flags being used to identify defective pixels within the detector array, with such flags being added to, or inserted into, the incoming data stream for dynamic processing along with the incoming pixel data, wherein the charge of the pixels adjacent to the defective pixel is accumulated when interpolation is performed to correct said defected pixel based on the location of the defected pixel determined by the flag (Col. 4, line 49 – col. 5, line 44; col. 5, line 55 – col. 6, line 55; col. 8, line 66 – col. 9, line 46; col. 9, line 61 – col. 10, line 20).

Therefore taking the combined teaching of McNeil in view of Colbeth as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention

was made to modify McNeil by detecting the defective pixels in the sensor and accumulating the charges of the pixels adjacent to a detected defective pixel. The motivation to do so would help to correct the defective pixels by performing interpolation as suggested by Colbeth (Col. 9, line 61 – col. 10, line 20).

Regarding claim 12, the combined teaching of McNeil in view of Colbeth as applied to claim 9 teaches means for ignoring such charge values of the output node, which are distorted by at least one defected pixel (Colbeth teaches that accumulate the charges of the non defective pixels to correct the defective pixel, thus, the charge of the defective pixel is ignored, see Col. 9, line 61 – col. 10, line 20). Grounds for rejecting claim 9, apply here.

Regarding claim 13, the combined teaching of McNeil in view of Colbeth as applied to claim 9 teaches means for determining the groups of pixels that are selected to be accumulated and measured to include all pixels the charges of which are not distorted by defected pixels in the readout process (Colbeth teaches that accumulate the charges of the non defective pixels and then uses that accumulated and measured data to correct the defective pixel, see Col. 9, line 61 – col. 10, line 20). Grounds for rejecting claim 9, apply here.

Regarding claim 15, the combined teaching of McNeil in view of Colbeth teaches the same as in claim 9. Therefore, grounds for rejecting claim 9, apply here.

5. Claims 16, 19 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over McNeil, US Patent 6,800,452 B1 in view of Colbeth, US Patent 6,424,750 B1 and further in view of Kaifu, 6,497,084 B2.

Regarding claim 16, McNeil discloses a method for measuring radiation from an object (test samples as discussed in col. 2, lines 56-67; col. 7, lines 53-67; col. 11, line 65 – col. 12, line 8) with a charge coupled device (Fig. 2B: 203) comprising a matrix of pixels arranged in rows and columns (Col. 11, lines 11-61; col. 20, line 49 – col. 21, line 5), in which method the radiation creates charges to the charge wells of the pixels (Col. 11, lines 11-61; col. 20, line 49 – col. 21, line 5), charges from a column of the pixels is shifted to a serial register (Col. 11, lines 11-61; col. 20, line 49 – col. 21, line 5), the charges in a serial register are shifted to an output charge well (Col. 11, lines 11-61; col. 20, line 49 – col. 21, line 5), the charge is measured from the output charge well and charges from at least two pixels are accumulated into the output charge well (Figs. 3A-3B teaches that the charges form the area 301 of the CCD are read out by binning the pixels of the area 301 as discussed in col. 11, lines 11-61; col. 20, line 49 – col. 21, line 5, thus, it is taught that at least two pixels are accumulated into the output charge well of the CCD sensor of the camera 203 to produce the output result as shown in figs. 3A-3B). McNeil does not explicitly disclose that the pixels whose charges are accumulated are determined on the basis of the positions of at least one defected pixel in the sensor.

However, Colbeth teaches an X-Ray imaging system that performs binning of analog pixel signals from a detector array (Fig. 2: 12 and fig. 3) by selectively summing, within the detector array, adjacent pixel charges on a row-by-row basis and selectively

summing, within detector array readout circuits, the previously summed pixel charges (by rows) on a column-by-column basis, also teaches an array, or mapping, of defective pixel flags being used to identify defective pixels within the detector array, with such flags being added to, or inserted into, the incoming data stream for dynamic processing along with the incoming pixel data, wherein the charge of the pixels adjacent to the defective pixel is accumulated when interpolation is performed to correct said defected pixel based on the location of the defected pixel determined by the flag (Col. 4, line 49 – col. 5, line 44; col. 5, line 55 – col. 6, line 55; col. 8, line 66 – col. 9, line 46; col. 9, line 61 – col. 10, line 20).

Therefore taking the combined teaching of McNeil in view of Colbeth as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify McNeil by detecting the defective pixels in the sensor and accumulating the charges of the pixels adjacent to a detected defective pixel. The motivation to do so would help to correct the defective pixels by performing interpolation as suggested by Colbeth (Col. 9, line 61 – col. 10, line 20).

The combined teaching of McNeil in view of Colbeth fails to teach that the charges are accumulated are determined on the basis of the positions of at least one defected pixel in the sensor so that the defective pixel values do not propagate beyond the output charge well.

However, Kaifu teaches an image sensing apparatus (See fig. 1) having an X-ray image sensing unit (Fig. 1: 111) and a mask table (Fig. 1: 115) for storing beforehand the position of each defective pixel in the X-ray image sensing unit, wherein a switch

(Figs. 1: 114) disable the reading of pixel signals when a signal of a defective pixel is to be output based on said mask table (Col. 2, lines 43-64; col. 3, lines 10-24).

Therefore, taking the combined teaching of McNeil in view of Colbeth and further in view of Kaifu as a whole, it would have been obvious to one of ordinary skill in the art at the time the invention was made to turn disable the reading of pixel signals when a signal of a defective pixel is to be output based on a mask table having the position of each defective pixel in the X-ray image sensing unit stored beforehand. The motivation to do so would have been to prevent the read mode from being wastefully changed by the invalid area and defective pixel signals present in the sensor so as to collect only the useful signals prior digitizing and processing.

Regarding claim 19, the combined teaching of McNeil in view of Colbeth and further in view of Kaifu as applied to claim 16 teaches that the charges values of the output node are ignored, which are distorted y at least one defected pixel (Colbeth teaches that accumulate the charges of the non defective pixels to correct the defective pixel, thus, the charge of the defective pixel is ignored, see Col. 9, line 61 – col. 10, line 20). Grounds for rejecting claim 16, apply here.

Regarding claim 20, the combined teaching of McNeil in view of Colbeth as applied to claim 1 teaches that the pixels that are accumulated and measured include all pixels the of which not distorted by defected pixels in the readout process (Colbeth teaches that accumulate the charges of the non defective pixels and then uses that accumulated and measured data to correct the defective pixel, see Col. 9, line 61 – col. 10, line 20). Grounds for rejecting claim 1, apply here.

Allowable Subject Matter

6. **Claims 2, 3, 6, 10, 11, 14, 17 and 18** are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

7. The following is a statement of reasons for the indication of allowable subject matter:

Regarding claims 2, 10 and 17, the reasons for indication of allowable subject matter is because the prior art fails to teach or reasonably suggest that the charge value of the output node is read when charges of distorted value enter the charge well of the serial register, which is closest to the output node.

Regarding claims 3, 11 and 18, the reasons for indication of allowable subject matter is because the prior art fails to teach or reasonably suggest that the charges from the serial register are shifted to the output node when charge from a defected pixel enters the pixel column of the parallel register, which is closest the serial register.

Regarding claims 6 and 14, the reasons for indication of allowable subject matter is because the prior art fails to teach or reasonably suggest that when any charges in a group of pixels within one rectangular area is distorted in the readout process by a defected pixel at least one subset group of pixels is formed wherein none of charges in the subset group of pixels within said rectangular area is distorted in the readout process by a defected pixel said subset group of pixels being accumulated as a super pixel.

Conclusion

8. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Contact

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nelson D. Hernandez whose telephone number is (571) 272-7311. The examiner can normally be reached on 8:30 A.M. to 6:00 P.M:.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ngoc Yen Vu can be reached on (571) 272-7320. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Nelson D. Hernandez
Examiner
Art Unit 2612

NDHH
October 2, 2005

NGOC-YEN VU
PRIMARY EXAMINER